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MALADIES OF THE HEART



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SCHOOL OF MEDICINE
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Points of Practice

in

Maladies of the Heart

LUMLEIAN LECTURES AT THE ROYAL COLLEGE
OF PHYSICIANS OF LONDON

BY

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CONSULTING PHYSICIAN TO THE QUEEN'S HOSPITAL
LATELY A PROFESSOR OF MEDICINE
IN THE QUEEN'S COLLEGE

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SCHOOL OF MEDICINE,
UNIVERSITY OF LEEDS.

TO

SIR RICHARD DOUGLAS POWELL, BARONET

K.C.V.O., M.D.

PRESIDENT OF THE ROYAL COLLEGE OF PHYSICIANS

PHYSICIAN IN ORDINARY TO H.M. THE KING

THESE LECTURES

DELIVERED BY HIS WISH

ARE DEDICATED

WITH MUCH RESPECT AND ESTEEM

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SUMMARY OF CONTENTS

PAGE

LECTURE I.

Acknowledgments.—Statement of subject.—Progress in cardiac pathology and therapeutics in forty years.—Physical signs.—Juster estimation of valvular and mural lesions.—Improvements in prognosis.—Influence of discovery of the stethoscope.—Value of physical methods of examination.—Frequency of maladies of the heart.—Wide vital and pathological connection of maladies of the heart. Importance of the lymphatic circulation.—Wide connections of cardiac disturbances.—Therapeutics in diagnosis, and in prognosis.—A heart case is never only a heart case.—Recent advances in the histology and in the physiology of the heart.—Myo-neurogenic theory.—Security against stoppage of the heart's action.—Co-operation of physiology and medicine in practice, after the example of Harvey ... 9

LECTURE II.

Inspection in maladies of the heart.—Impulse beat.—Instances of the value of inspection.—Inspection in cases of pericardial effusion.—Post-systolic tug.—Inspection from above and from below.—Physiognomy of disease.—Cheyne-Stokes respiration.—New sign of failing heart.—Physiognomy of extreme cardiac distress.—Palpation in maladies of the heart.—Indications furnished by palpation.—Valvular cardiac thrill.—Cardiac thrill as a neurotism.—Palpation in adherent pericardium.—Abiding usefulness of palpation in maladies of the heart.—Great value of mediate auscultation in maladies of the heart.—Improved stethoscope for auscultation of the heart.—Reasons for preferring a solid stethoscope to a tubular one in auscultation of the heart 36

LECTURE III.

Descriptive divisions of cardiac maladies.—Dynamic and organic affections of the heart.—Increasing remedial control of the heart's functions and of its nutrition.—Summary of organic changes in the heart.—Certainty of physical diagnosis, and the value of experience in its interpretations. Organic disease complicated by functional disturbances.—Five groups of maladies of the heart.—Failure of the heart's musculature.—Importance of extrinsic disturbances.—The nervous temperament and maladies of the heart.—Signs of the nervous temperament.—Lingual physallization.—Temperaments and handwriting.—Worry and functional disorders of the heart.—Treatment of worry.—Description of souffles de consultation, and of their mode of production.—Dangers of adherent pericardium.—Mitral insufficiency.—Accentuation of the pulmonary second sound.—The therapeutic action of digitalis in diseases of the heart.—Baillie's pill.—Value of venesection in diseases of the heart.—Physical exercises, respiratory exercises, local plasters, rubefacient embrocations, alcohol, generally, and usquebagh and ipocrasse, in particular, in maladies of the heart 66

SCHOOL OF MEDICINE.
UNIVERSITY OF LEEDS.

LECTURE I.

(Delivered on Thursday, March 26th, 1908.)

Mr. President, Fellows, and Gentlemen :—

Pray allow me to express my high appreciation of the honour which the President and Censors of our College have placed upon me, in their invitation to deliver the Lumleian Lectures. I understand that these historic and commemorative lectures are always given by a senior among the Fellows, and are upon some subject in the practice of medicine. Such an authoritative invitation conveys and imputes a prescriptive obligation to its acceptance. So I obey. For the fulfilment of this allotted duty I have turned to records and memories of many years of clinical investigation, of bedside teaching, and of reading in medicine, and I have found amongst them a subject of our practice which is of perennial interest, which has, indeed, been brought before the College of recent times in many of its manifold aspects by several distinguished Fellows, but it is a subject which can never be absent from the minds of those who realize the possibilities

which attend the physical investigation of the living manifestations of disease. Within the time at our disposal one could not relate an orderly and complete account, even with vigilant brevity, of the diagnosis, prognosis, and treatment of the heart's organic diseases and functional disturbances. I can attempt only to offer to my hearers, with great respect and deference, and in as orderly an arrangement as may be, some portions of those subjects, so far as they have engaged my experience in medical practice, in thought, in observation, and in some literary and experimental research. With full confidence in the sympathetic support of my audience, I venture to invite my brethren to give their attention again to topics which are familiar to them, while I try to discharge the office which has been bestowed upon me, by those in authority in this renowned and venerable College.

There is nothing which pathology touches which does not adorn a physician's understanding of the heart. No therapeutics can ignore that organ's weal. Those of us whose memories of cardiac pathology and therapeutics extend over, say, forty years,—those practising physicians whose clinical experiences cover a participation in the views and work of our

profession which were current at any particular time within those four decades, in our views concerning the several blended subjects of the diagnosis, prognosis, and treatment of maladies of the heart, will be likely to agree that certain shiftings of our points of view in these important matters have been evolved from our joint and several work. Such movements of thought are largely subconscious, and sometimes it is well to note their existence and to take stock of their effects. While several very distinct additions, and some of them enduring ones, have been made to our knowledge of the origins, of the courses and of the treatment of diseases and disorders of the human heart, and whilst amongst those additions to our science and to the resources of our art are to be counted no less signal gains than the invention and the use of Marey's sphygmograph and of his cardiograph, the portentous discovery of a new and a microbic pathology, and Lauder Brunton's great gift of the potent therapeutics of the nitrites, while these epoch-making advances, and many other improvements, perhaps less notable and of less momentum, have been achieved, our physicians' view, while it has broadened and brightened, does not appear to have spread and cleared quite symmetrically.

Perhaps it is always so with an art which is perpetually indispensable to humanity, and which rests upon an ever widening and ever deepening science, like our art is and does. Forty years ago, the stethoscope of Laennec, as then not old, was biassing us towards a reliance which was, perhaps, not seldom an undue one, upon its enthralling revelations. That "gift of science to a favoured son," as Stokes called it, dazzled us, perhaps, and not a little. We might sometimes not recollect that physical signs, how plain and positive soever they may be, are not a diagnosis, but only a help to it; at the most, only one of its foundations, and, great and reliable as they are, nothing more. I understand it is a maxim of criminal law that direct evidence is not so reliable as complete circumstantial evidence. So is it in medicine as to diagnosis, even in physical diagnosis. Of the great value of the physical signs of disease, as they are brought out by the stethoscope and other similar aids to their manifestation, we have all been long agreed. As Stokes soon pointed out, "it is on the discovery, explanation, and connection of those signs with organic changes, and with the symptoms and history of the case, that Laennec's imperishable fame is founded."*

* Treatise on Diseases of the Chest. Dr. Stokes.

“ With the symptoms and history of the case,” of *the* case, be it noted, “ case ” in the singular, each one by itself, with its own unique individuality. But, forty years ago, physicians, it would seem, had not then quite “ got over ” the appearance of the stethoscope, and the comparative perfection of the science of auscultation. About twenty-five years ago, and many years after this great advance in auscultation, certain advances in microscopic and in comparative pathology, and in bedside research, turned us, perhaps a little too far for a just balance, turned us from our auscultatory refinements as to defects of valves and of orifices, and from our explanations, perhaps too mechanical, of physical defects and their consequences, to a fuller and truer examination and appreciation of the part which we had to give in our cardiac pathology and therapeutics to many vital changes in the shape and structure of the heart’s flesh and in the form and texture of the blood-vessels. And, now, of later times, with a maturer mind, we find the just mean between these two views; each point of view is taking its right place in a better understanding of the maladies of one of the chief of the central organs of our lives. Amongst those of our leaders who have pointed out such a justly

balanced view are two of my distinguished predecessors in this chair, the late Sir William Broadbent* and you, yourself, Sir,† each of whom has addressed the College with much illumination upon the principles and practice of physic in regard to diseases and disorders of the heart.

Of much interest would it be to practising physicians to trace the growth of knowledge of the nature and treatment of maladies of the heart, not from the beginning of such a history, for that would be a long account remounting to the remotest records of our art, but during the last hundred years, or, as approximately that time, in the nineteenth century. In ailments of the heart, in that hundred years, a surely grounded hope, and our powers for the patient's good, have grown apace. At the beginning of that century Baron Corvisart, the learned head of the imperial medical service of France, opened his classic book on diseases of the heart with a line of well nigh hopeless

* Dr. (afterwards Sir) William H. Broadbent was the Lumleian Lecturer in 1891, and the subject of his lectures was:—"Structural Diseases of the Heart from the point of view of Prognosis."

† Sir Richard Douglas Powell was the Lumleian Lecturer in 1898, and the subject of his lectures was:—"On the Principles which govern Treatment in Diseases and Disorders of the Heart."

sound: "*Hæret lateri lethalis arundo.*"* True was this sombre superscription in his time, when even Withering's immortal revelation of the curative uses of digitalis, of a decade or two earlier, did not appear to have passed into current professional knowledge. But such was the advance of medicine that Walshe, soon after the middle of the century, was able to declare that the gloomy meters of Corvisart's Virgilian quotation had lost much of their fitness to his subject, and to ask us to rejoice with him, as he did in the last edition of his great book, in 1873, that our knowledge of non-organic affections of the heart had found a wide extension, as to their nature and as to their successful treatment, while he was able to declare too, as he did in his precise and cautious way, that medical means of controlling the progress of structural diseases of the heart had continued to improve, and that their hygienic management had made marked advancement.† Another distinguished Fellow of the College, Peter Mere Latham, told us that, when he came up

* A Treatise on the Diseases and Organic Lesions of the Heart and Great Vessels. By J. N. Corvisart, M.D. Translated from the French by C. H. Hebb, M.R.C.S. London. 1813.

† A Practical Treatise on Diseases of the Heart, &c. By W. H. Walshe, M.D., F.R.C.P., &c. London. 1873.

to St. Bartholomew's from Oxford, in 1810, the treatise of Corvisart was in the hands of all the students, and that it deserved to be, for in it there was full knowledge of the best kind given in the best way; and he pointed out that Corvisart was the first to bring the whole subject of the pathology and diagnosis of diseases of the heart out of obscurity, that it seemed impossible that the diagnosis of these diseases could have been carried further than Corvisart brought it by anything less than some new discovery in clinical observation, and such discovery was made by Laennec in his momentous invention of mediate auscultation.* Since Walshe's time the progress he helped so much has been kept up. Our diagnosis has gained in precision, our therapeutics has grown in range and in exactness, in the use of new drugs and in estimation of older ones, while what Walshe called the hygienic management of cardiac maladies has been helped by knowledge of how to live in physiological obedience, and by the reasoned use of physical exercises, such exercises being selected upon a skilled appreciation of the possibilities of each patient. In ailments of the heart it has been as true as

* Collected Works of Dr. P. M. Latham. Vol. I. New Sydenham Society. 1876.

it ever is in our practice, that the proportions of our power take measure from the extent and precision of our knowledge. During the later three-quarters of the nineteenth century, and until to-day, the clinical study of maladies of the heart has been carried forward with untiring industry and with much success. In no other part of the science and practice of medicine has more brilliant advancement been won, in practical knowledge and especially in remedial opportunities. It is beyond question that this great progress has been due in a large part to the use of various methods of physical examination, in the investigation and treatment of these affections. These methods have been multiplied, their applications refined; and the results of their employment have been differentiated more and more. Especially has the discrimination of cardiac maladies by the objective signs yielded by percussion and by auscultation been advanced to much precision, and all this by continued and by multiplied toil, by the bright contrivings and long researches of many minds and by the patient labours of many hands. The older physical methods of inspection and of palpation have not been superseded; rather has our later elaborations of auricular methods, in auscultation and

in percussion, strengthened the indications and pointed the value of those signs which the watchful eye can see and the erudite hand can feel.

Still limiting this brief retrospect to the hundred years last past, one may note two other important details in which our notions as to maladies of the heart have found significant development. One of these points concerns the frequency of these affections; the other springs in part from a recognition of that frequency, and is that wider view of cardiac diseases and disorders which is giving us a more efficient grasp of their treatment, of their treatment not by drugs alone, but also by hygienics, and by every agency we can bring into use for the help of their therapeutics. The frequency of heart affections, relatively to that of other human maladies, does not appear to have increased of later times. The forces which make up the stress and strain of the later civilization do not seem to have caused increase in the relative number of cardiopaths amongst us, if, perhaps, we may except those heart ailments which go with certain neuroses, of which neuroses a marked phase is what may be called an exaggerated consciousness as to the heart. As to the more serious cases, it is likely

that a more general temperance in the taking of victuals and of drinks, non-alcoholic as well as alcoholic, together with the cultivation of personal hygiene, has lessened the frequency of those cases of serious heart disease which arise from chronic alcoholism, from chronic renal disease, from rheumatism, from gout, and from syphilis. It would seem that these conclusions are what long experience in practice suggests. But maladies of the heart have been shewn by modern clinical methods to be more frequent than they used to be thought to be. Since physical diagnosis has found its modern developments as to the heart the affections of that organ have been found to be amongst the commonest of illnesses, in every country and at every time of life. Upon this point a former president of the College, Sir Thomas Watson, said he could remember "the time when disease of the heart was thought to be a very rare thing"; but that such disease became to be regarded as one of the commonest of disorders, and as connected with a variety of other affections with which it was formerly supposed to have no relation.* This change of view, this finding of the truth, was in part a sudden revelation

* Lectures on the Principles and Practice of Physic. 3rd edition. London. 1848.

due to mediate auscultation, and in part a gradual growth from the use of that and of other physical methods of clinical research. It was one of the products of modern methods of exploration in diagnosis, when the systematic use of those methods was blended with the teachings of an advanced physiology, and with the discoveries of a wider and minuter pathological science.

From this recognition of the abiding frequency of organic diseases and of functional disorders of the heart, and from a truer appreciation of the causes of that frequency, has arisen a great and far-reaching qualification in our view of how far the structural and functional changes which form the maladies of the heart may be dealt with as things somewhat apart, of how far such changes should be regarded as portentous matters with an impress and intrinsic characters of their own, as matters which have a peculiar clinical and vital detachment, as it were, of their own kind. Modern physiology, modern pathology, and physical diagnosis have each widened our view. Our later physiological knowledge has given us proofs to demonstration of how manifold, how intricate, and how widely spread throughout the human body are the influences which

govern and affect the circulation of the blood. Physiology has shown us that, at the centre of the human circulatory system, of heart, arteries, capillaries, and veins, there lies and works the cardiac musculature, and near the periphery the musculature of the minuter arteries, and that on these two instruments of power many influences are constantly acting and reacting, according to the needs of the body. More and more have morbid cardiac changes become to be seen as what they are, as incidents, though prominent and often vital ones, in many pathological abnormalities. It is seen that the heart, in its complex functions in health and in their manifold derangements in disease, is the main-spring and active centre, the "prince in the commonwealth," as Harvey called it,* in a vascular system which comprises, besides itself, and the arteries, capillaries, and veins of the systemic and pulmonary circuits, the lymphatic vessels and the lymphatic glands, together with certain ductless glands, and the blood also, and the various fluids which may be its tributaries. We remember how inseparable are the lymphatic and the sanguineous circulations, how intimate is their

* The Anatomical Exercises of Dr. William Harvey, &c London. 1653. Harvey was the Lumleian Lecturer in 1615.

connection in structure and in function. The circulating lymph is slowly moving, from the blood and into the blood, exuding from the blood through the walls of the capillaries, and flowing back to the blood, with what it may bring with it, through the lymphatic vessels, which vessels come from all parts of the body, and at last form the greater and smaller thoracic ducts, which are always pouring their contents into the blood in the left and in the right subclavian veins. We know how important is this lymphatic circulation, to the blood and to the heart. We know how large is the whole amount of lymph in the healthy living body; it is measured at twenty-five to thirty per cent. of the body-weight, that is, at three or four times the amount of the blood.* As to the place of certain ductless glands in the scheme of the vascular system, we may recall that the fruits of some recent researches shew the relationship of the functions of those glands with the beats of the heart. Cyon, who is distinguished as one of the discoverers of the accelerator nerve of the heart, has recently developed his hypotheses that the thyroid, adrenals, and pituitary are glands which have the especial function of regu-

* Human Physiology. By Augustus D. Waller, M.D., F.R.S. London. 1893.

lating the nerves of the heart, and even that the proper action of the pneumogastriacs is maintained by a secretion of the thyroid.*

But our wider view in every case of disease or of disturbance of the heart must be far wider still. Extended and complex as is the vascular system, it is only one of many so-called systems of the human body which are in living co-operation with it. Not one of such systems is there but what is "in touch," so to speak, more or less directly, with each function and with every derangement of the heart, through nervous impulses of excitation, of depression, of inhibition, and these sometimes of thought, of volition, or of feeling, through the conveyance of secretion or of excretion, through rest or unrest, through warmth or cold. We know, with knowledge which is especially particular, how manifold and how close are the connections of the heart, through its innervation, with the brain, with the spinal cord, with the sympathetic system of nerves and ganglia, and, through these, with all the parts which they animate and govern. In our view of each case of cardiac affection the complete grasp of the

* Review in *The British Medical Journal* of *Die Nerven des Herzen, ihre Anatomie und Physiologie*, by Dr. E. von Cyon, August 10th, 1907.

whole case must go with the narrow observation of the disturbed part. While each distinct change in cardiac structure or in cardiac function must be observed separately, must be separately recognized and described, and sometimes traced separately to its pathological origin, while our progress in practice in maladies of the heart cannot add to our knowledge of them without such minute and distinct consideration, yet the whole of each case must be grasped, in its living combinations and in its working relations, if the therapeutics and all other management of the case are to be understood, if they are to be conducted aright. For no detail must the whole be neglected.

In this greater grasp our therapeutics has its own place, and this not only for its own usual, direct, and essential usefulness, but also because of its reflex illumination of our diagnosis, and of our prognosis. The very treatment of diseases, rightly considered, is, as we all know, and as Latham wrote when there loomed largely in his mind the treatment of the very maladies we are now regarding,—the very treatment of diseases is truly a part of their pathology. “What they need,” as he put it, “and what they can bear, the kind and strength of the remedy, and the changes which follow

its application, are amongst the surest tests of their nature and tendency.”* We know that this dictum of a great physician is very true as to cardiac affections. The treatment of diseases of the heart is among the tests of the nature and tendencies of those maladies. In any particular instance of disease the therapeutic response to a remedy is a basis of judgment as to the nature of the case, both in diagnosis and in prognosis.

And further, a heart case is never only a heart case. A heart case is never only a heart case, be it either a functional one or be it an organic one, as so a case may be called. If some neurosis or if some temperamental neurotisms be causes in a heart case, then the whole of such neurosis or all of such neurotism, even to their remotest causation, is in question. If structural change in the heart be the proximate basis of the case, putting aside for the moment the general and local changes of metabolism, or of infection from without, or of degenerative metamorphosis, or of these variously combined, which may be the remoter bases of it,—if structural change in the heart be the basis of the case, that change has either

* Collected Works of Dr. P. M. Latham. New Sydenham Society. Vol. I. 1876.

begun in the heart and is extending to the arteries, or it has begun in the arteries and is extending to the heart, or it has begun coincidentally both in the heart and in the arteries, of which last case we have instances in the more fatty forms of degeneration. For the understanding of a heart malady all its accompaniments must be appreciated.

It is, perhaps, not to say too much to say, that he best understands heart maladies who knows how so to elaborate his perception of their pathological, symptomatic and circumstantial accompaniments, by the light of experience in practice and by the illuminating light of a tempered clinical imagination,—so to elaborate his perception of their accompaniments in a particular case as to accentuate his perception of their essence. There must be, then, in this greater grasp, the practice of our old rule of a close observation of the disordered organ and also a close observation of the whole of the suffering body. So we may take in the whole clinical image at once, with its lights and shades in due array. Such a way, a just and proportioned estimation of all the circumstances of a case of disease is the way of us all, in these affections and in others. Its wisdom is to be seen especially in all points of practice in

cardiac cases. In this view, in such cases, there is nothing in the science of life which may not aid us, there is nothing in our knowledge of humanity which may not help us, there is nothing of what is human which we may think alien to our work. Surely of such is the higher philosophy of medicine. Perhaps this ampler view as to ailments of the heart, this wider reach of what is practicable in their successful treatment, is only possible to the full to those who long have known the details of the pathological processes and of the clinical manifestations of these disorders. It comes surely to such, as their working years lengthen on, till,

“Old experience doth attain
To something of prophetic strain.”

In the last few years many advances have been won in the histology and physiology of the heart and of the blood-vessels. Especially has our knowledge grown as to the government of the heart and of the arteries through their nervous supply. Through this supply it is that the force and the frequency of the heart's beats are ruled, that the tone of the arteries is kept up, so far as it depends upon arterial muscularity, and the peripheral resistance is controlled, so far as that complex factor in the blood-flow depends upon the tightening or upon

the slackening of the muscularity of the lesser arteries. The paths of innervation through which the heart's beats are roused and hastened; through which they are checked and slowed; through which the arteries, and especially the smaller and smallest ones, are braced or unbraced; the efferent depressor path from the heart, through which, by exact mutual adjustment, the force and rate of the heart's beats and the tone and bore of the arteries are balanced; and, lastly, "the band of His," a singular fibromuscular fillet, found, with its knot-like thickening, with its branches in the ventricular walls, and forming a union between auricle and ventricle through which systolic impulses spread from the one to the other,—all these paths of power have been found. A working scheme of cardiac and cardio-vascular innervation has been made out, and this, in the main, from proven and evident facts, and with small mixture of hypothesis, so that much in cardiac pathology has found explanation therein, and so that our understanding of maladies of the heart has grown, to the advancement of our practice in diagnosis, in prognosis, and in treatment. We all know how an intimate knowledge of this innervation interprets to us in practice many points in the courses of certain affections

of the heart. It is sometimes said that we have long relied upon an explanation of the action of the heart which may be called the neurogenic theory. But the heart's innervation and musculature are inseparable in the action of the organ. Our theory of yesterday was a neuromyogenic theory, with an allowance for contractile spontaneity in the heart's musculature, resting on metabolism. Recent researches give fuller knowledge of the play of this musculature, of a kind suggestive of therapeutic consequences. The functioning of the heart seems to depend upon several separable qualities in the cardiac muscular tissue. Amongst these are the power of originating its own stimulus to contraction and of distributing it from part to part of the heart, its excitability or sensitiveness to such stimulus, its contractility and its tone. It appears, further, that the function of tone, which is a characteristic of every living muscular fibre of the heart, is most marked in the fibres which encircle the valved orifices and the openings of the veins into the auricles, that the contraction and the tone of the fibres in these situations help in closing the valved apertures, and are wholly effectual in closing the non-valvular orifices when such orifices need to be closed in particular parts of each cardiac

cycle. All this later knowledge is full of suggestion in our practice, diagnostic and therapeutic. Such a statement of the action of the heart may be called a myogenic theory. It is, in truth, a myo-neurogenic one. It gives prominence and lead to the functioning of the heart's musculature, in the combined results of the action and interaction of that musculature and the cardiac innervation. Clinically this later teaching increases the significance of changes in the myocardium. From this recent knowledge we may draw a new and a momentous conclusion. It is this. Now that we know that the initiation of the heart's beating is inherent in the musculature of the organ, we see in such a fact a remarkable safeguard for the continuance of the beating of the heart, and for the recovery of that beating after a momentary suspension, in the presence of the paralysing effect of some shock to the heart, of such a cardio-inhibitory shock as may arise from a great somatic muscular effort or struggle, or from violent and profound emotion, or from some traumatism, or from some anæsthetic inhalation. That the cardiac musculature, of its own intrinsic spontaneity, leads, leads under nervous sustenance and regulation, it is true, but that the musculature does lead

in the heart's action, can save the beating of the heart from final stoppage, under stresses which, but for this defence, might close its career for ever.

While the discoveries of physiologists have led us to more exact and larger notions of many details in the intimate structure of the heart and of the blood-vessels, and in the dynamics of the several parts of the cardio-vascular system, and whilst such discoveries have prompted some refinements in our diagnosis of cardiac maladies, and have suggested further precision and resources in our therapeutics, while the revelations of truths due to the labours of our physiologists have given us much for which we had devoutly wished, yet practical medicine has not always waited for such discoveries. In that field of our practice which we are now considering, as in other fields of our practice, the working hypotheses of clinical medicine have sometimes anticipated the later demonstrations of exact physiological investigation. Sometimes has physiology proved to be true that which clinical medicine had believed before to be true, if our action be the test of what we believe, and belief has no other test. Of this physicians may recall for their encouragement a striking instance. In that subject of much

import and of much controversy, the causes of the sounds of the heart, while the causes of those sounds have been made clearer and nearly settled, and that, perhaps, finally, by the experimental researches of our physiologists, we may yet claim that this question has been fairly worked out by clinicians, with their own materials, by clinical observation of physical signs and by post-mortem examination, and from the standpoints of practice, in diagnosis, treatment, and prognosis. In this particular of the causation of the heart's sounds, and of their deviations, the experimental work of the physiologist and the findings of the physician in practice have confirmed each other. A reasoned recapitulation of our knowledge of the physiology of the circulation of the blood would offer to an audience skilled in practice many points of suggestiveness as to maladies of the heart. Such a recapitulation is unnecessary before my hearers. Our Harvey, the Lumleian lecturer of this College,* showed in his discovery of the circulation of the blood that physiology is an integral and inseparable part of the science of medicine. True to his lead, our recent progress in practice as to maladies

* In 1615.

of the heart has been won as the natural effect of physiological discovery; at the least, a large part of it has been so accomplished. Our daily practice of medicine in cardiac diseases and disorders is depending more and more upon our physiology, and notably so as to our interpretation of so-called functional derangements of the heart, as to our comprehension of the natural means of relief in abnormalities of arterial tension, as to the therapeutic actions of many drugs, and as to the remedial value, the selection in particular cases, and the methods of employment of physical exercises, and of certain activities allied to them. Our physiology gives clue upon clue to our diagnosis, to our predictions, and to our invention and choice of remedies. As in every range of practical medicine, but in salient illustration as to the heart, there is no intelligible basis of treatment which is not physiologically sound. As new truths emerge, physicians know how to find their application, and to translate the advances and resources of science into utilities in practice. Perhaps a closer walk with physiology would dispose of many cases of so-called increased peripheral resistance. Physiology shews us how complete are the natural means for the adjustment of arterial tension and tone

to the needs of the due circulation of the blood, of the circulation of the blood in each of its circuits.

As, then, to the heart in disease, in disorder, and in health, the indebtedness of medicine to her own physiology is enormous indeed. Recent physiology has discovered much concerning the circulation of the blood in our species, and all that it has discovered in that regard bears, or will bear, upon our practice. Our understanding of affections of that circulation in the sick, whether their seat be in the heart, or in the blood-vessels, or in the blood, or wherever elsewhere, or in these in ever varying combinations,—our understanding of these maladies has been cleared, if not finally illuminated, and to the illustration of our practice in every cardiac malady. With regard to the systemic circulation, we now know that, in the midst and at the core of the currency of the blood lies the musculature of the heart, with the muscular arterioles near the periphery. Upon these two living, contractile, and expansile elements the central nervous system, directed and governed by this or that impulse reaching it along afferent nerve fibres, or affected by this or that influence, is continually playing; is playing in balanced, in

harmonized, in reciprocal, and in compensatory actions, now in augmentation of contraction, now in inhibition of it, and so, by help of the elasticity of the arteries and the mechanism of the valves of the heart and of the veins, directing the blood flow according to the needs of the body.* From this newer knowledge, not a little of it the produce of our own time, we may be sure that our future progress as to the care and cure of maladies of the heart will depend largely upon whatever further help physiology may be able to furnish. After the manner of Harvey, and of others of the old time before him, physiology, as a part of medicine, and medicine in her pathology and in her practice, have gone forwards in interdependence; and so it will be, while clinicians make our science more practical, and physiologists our practice more scientific.

* The abridged account of the circulation of the blood given in this sentence has been expanded and amended from Sir Michael Foster's summary, as given in his "Text Book of Physiology."

LECTURE II.

(Delivered on Tuesday, March 31st, 1908.)



Mr. President, Fellows, and Gentlemen:—

Maladies of the heart illustrate the truth that nothing in nature is presented to us in an abstract form. In our study of those maladies, when we have formed a correct view of their elementary qualities, the more concrete instances attract our attention and excite our thought the more rapid and complete our progress in understanding their character. While each of the four chief and well-known methods of physical examination is commonly employed by us in our examinations of the heart in practice, it would seem that those methods, in the hands of most of us, stand usually in order as to the time of their use as, firstly, inspection, then palpation, then auscultation, lastly, percussion. In proportion as an observer ripens in his experience, it is usual that inspection, as one of the cardinals of physical diagnosis, enhances for him its value. In time, at the least, inspection usefully may precede

palpation, auscultation, and percussion in cases of the systematic exploration of affections of the heart. Our diagnostic inspection is a narrow search, a close and careful scrutiny by sight, in which, as in every use of a sense, our minds supply more than the sense receives, in which, in this skilled use of sight, our trained minds supply the additions and corrections of our experience, in interpretation of our sensual impression. Besides the more direct advantages of inspection, we know its value in the avoidance of certain errors. Inspection is a method by which errors of mal-observation are minimized, and errors of non-observation practically excluded. In a heart case, after the use of all or of any of the other ways of physical examination, inspection may be used, or used again, to confirm the evidences of other methods, or to correct, or to amplify them. The principles and practice of diagnostic inspection in general, and of its use in maladies of the heart in particular, are well known. Some salient points as to the particular use before us may be cited in a few words. For the full use of inspection in these affections, a good light, as always, is needed, and the surfaces to be examined must be quite bared. Partial inspections cannot give the full results of the

method, and are fertile in pitfalls. Inspection of the cardiac area may be made properly when the patient is in the erect, the sitting, or the recumbent postures. Either the erect or the recumbent posture is the best. Sometimes examinations in two or in each of these postures may be made with great advantage. In systematic inspection of the front of the chest, comparing the front surfaces of the two sides by sight, point by point, from every aspect, as to their size, shape, and outline, it is found that the two sides are always identically proportional in every part, in chests perfectly normal. As Walshe found, it is found that, "in perfectly normal chests the part of the walls lying to the left of the middle line, and corresponding to the heart, does not differ perceptibly in form from that placed to its right; these two divisions of the thorax are symmetrical."* In some circumstances, though very rarely, this complete bilateral symmetry may be deviated from, either as a slight precordial excess of convexity, or even of depression, without there being proof of past or present disease of the heart. In by far the

* A Practical Treatise on Diseases of the Heart and Great Vessels. By W. H. Walshe, M.D., F.R.C.P., &c. London. 1873.

most of persons who are sound and healthy as to the heart, the impulse of the organ in its natural position is to be seen. "This spot, where the impulse is greatest, is," as Dr. Augustus Waller has reminded us, "often termed the 'apex-beat'—a misleading expression, for the true apex of the heart lies much deeper; a needle plunged through the spot of maximum impulse would pierce the left ventricle at the junction of the middle with the lower third. The cardiac impulse is not produced by the heart's tilting itself so as to strike the chest-wall; it is due to the sudden hardening and tension of the contracting ventricles, and the spot of impulse, or so-called 'apex-beat,' is simply the spot where the convex ventricular mass comes in contact with the chest-wall."* It would be more exact, in our present knowledge, to speak of impulse beat and impulse point than of apex beat, and some such better diction is taking the place of the older words. Undoubtedly the systolic bulging of the ventricles is most manifest a little higher than the true apex of the heart. This bulging, in its pressure towards the anterior wall of the chest, is the main part of the impulse. But

* Human Physiology. By Augustus Waller, M.D., F.R.S. London. 1893.

we appreciate that the mechanism of the apex beat is a complex one. So Walshe thought and taught. He found that, besides the systolic bulging of the ventricles, a swinging movement from the right side towards the left accompanies each systole, that this can be seen and felt in some spare people, and that its occurrence was substantiated by Bamberger. He found also that there is yet another systolic movement, that of the whole heart from above downwards, which is part of the heart's impulse as palpable outside the chest, and which is likely to be due to a systolic lengthening of the great vessels, such lengthening being more than enough to make up for the shortening of the ventricles when they contract.* This systolic elongation of the great vessels, causing a little falling downwards of the heart, seems to be the mechanical effect of a raised tension in the contents of bent and yielding tubes. So, then, the impulse beat is made up much of a push, somewhat of a screw, or swinging with a "side" on, and somewhat of a drop.

It may be permitted to cite a few well-known examples of the great value of inspection

* A Practical Treatise on Diseases of the Heart and Great Vessels. By W. H. Walshe, M.D., F.R.C.P., &c. London. 1873.

as to the examination of the heart. The absence of a visible impulse beat is by no means to be taken, by itself, as an evidence of any abnormality. The chest wall and its coverings may be too thick for the beat to be seen. The visible cardiac impulse varies somewhat in extent and in site in health, in certain circumstances. It is more extensive usually in males than in females, and in persons of the nervous temperament rather than in others. In disease, the place, force, extent, quality and rhythm of the visible impulse of the heart may be variously altered, and such changes may be in various combinations. When the heart is enlarged, the impulse beat is lowered in position. In such enlargement the visible impulse is also displaced, most frequently, to the left: if both sides of the heart be enlarged equally, this displacement is to the left; if only the left side be enlarged, or it mainly, the displacement is still to the left; if the right side of the organ be the part which is chiefly enlarged, then the visible impulse is displaced to the right, and is seen to be behind and below the sternum. In some cases of disease the displacement of the impulse point to the left is to the extent of three inches or more to the left of the left nipple; this extreme displacement usually marks an old case

of aortic regurgitation with great hypertrophy and dilatation of the left ventricle. Some bulging over the heart may arise from cardiac hypertrophy; but much cardiac hypertrophy may exist without any such bulging at all. Such bulging suggests the duration of the disease from early life, when the chest wall was more yielding than of later years. The greatest bulging marks certain cases of pericardial effusion, when the effusion is large and the patient a child or a young adolescent; in such a case, the precordial region and the parts of the front of the chest adjacent to it may be bulged markedly, with the intercostal spaces widened and raised to the level of the ribs, and even bulging beyond them. Walshe even found elevation of the left edge of the sternum. Dr. Octavius Sturges, in his Lumleian Lectures, pointed out that, when pericardial effusion is in large quantity, in children, there is, "what the eye measures—namely, widening of the left intercostal spaces from the second rib downwards, with accompanying elevation of these spaces," and with "an appearance of raised flatness . . . contrasting strongly with the natural contour of the ribs and spaces of the right chest."* Our distinguished Fellow, Dr.

* Heart Inflammation in Children. Lumleian Lectures. London. 1895.

Frederick Roberts, in his monumental essay on diseases of the pericardium, gives a graphic account of the local bulging and of the other physical signs which inspection may furnish in the proof of great pericardial effusion, and he points out the very important clinical fact that such bulging, "easily produced in children and in growing subjects, on account of the yielding condition of the chest walls," may be prevented entirely in older patients, in the presence of a large accumulation of fluid, by reason of the rigidity of those walls, such rigidity adding seriously to internal embarrassments arising from the bulk of the effusion * Inspection reveals, too, the permanent precordial depression which follows sometimes the absorption of inflammatory pericardial effusion, and which we may attribute reasonably to effects of adhesions. Furthermore, in what is probably a large proportion of cases of pericardial adhesions, inspection reveals a striking physical sign of pericardial agglutination, namely, what Walshe calls a "dimpling inwards . . . with the systole, at the apex." For many years it has been my habit

* Diseases of the Pericardium. By Frederick T. Roberts, M.D., F.R.C.P. In Professor Clifford Allbutt's System of Medicine, Vol. V. 1898.

to look for this sign in physical examinations, and I have found it often. I have found it both without concurrent proofs of eccentric hypertrophy of the left ventricle and in the presence of such evidences, but the more often in cases in which no signs of increase in the heart's size could be found. What I have found is a circumscribed and slight tug inwards of the chest wall, at the heart's impulse point; this tug following immediately the visible systolic impulse, occurring at once upon the subsidence of that impulse, and appearing to be a circumscribed accentuation of the natural post-systolic fall of the chest wall at the impulse beat, and looking like a pulling in of the chest wall at that part by a little tug from within, at the time when the surface of the left ventricle slips away from the chest wall in the post-systolic pause. This little tug is invisible in ordinary inspection from the front. To see it, our scrutiny must be close, we looking at the part in a sufficient light, with the patient standing up, and inspecting the surface in question from what may be called an easy reading distance, from the left side of the patient, with the part of the chest wall which is to be watched brought exactly into profile, and silhouetted against a background, of a wall, or other perpendicularly flat object,

of a good contrasting colour. In such observation of the part in profile this post-systolic tug can be seen to occur just at the end of the natural subsidence of the impulse, and can be recognized as a tug from within, added to the mere ending of the natural beat. In the discovery of this sign I have found an explanation of some obscure cardiac cases, and a suggestion for appropriate treatment in respiratory exercises.

Valuable diagnostic information as to the heart may be found by inspection of the front of the chest from above, with the patient in a sitting posture, and also by inspection from below, from below the patient's feet, when he is lying down upon his back. Visual examinations of the chest from these points of view afford us two useful developments of inspection in the diagnosis and observation of affections of the heart, of service in practice, and of especial strikingness in bringing out objective signs in clinical teaching. Inspection of the front of the chest from above is useful in shewing changes in shape and movement in the precordial region. The patient should be seated in a chair, the front of the chest bared, with his head bent a little forwards and downwards. The observer stands closely behind the

chair, and explores with his eyes the outlines of the patient's chest as they are seen from above, comparing in turn the outlines on each side with their correspondents on the other side. Inspection from below of the precordial area, and of the adjacent parts of the surface of the body, brings out strikingly many varieties of shape and of manner of moving. The patient lies on the broad of his back with chest uncovered. The observer stands a yard beyond the patient's feet, and "takes a sight" along the front middle line of the patient's trunk. Lateral deviations from symmetry are more salient in inspection from this aspect than from other points of view. The observer, by moving his head a little, may watch a variety of profiles. Outside the examination of the chest, this variant of inspection finds also excellent clinical application in the abdominal complications of certain cardiac maladies.

Besides this systematic local inspection, which is one of the classical methods of physical diagnosis, there would be always, too, in the examination of a case of heart affection, the usual further visual observation of the patient beyond the cardiac area, and which sight, general as to his whole appearance and local beyond the heart in certain important par-

ticulars, is known to us as of indispensable value, in revealing many points of symptomatic import, and of prognostics, and in therapeutic suggestiveness. The old art or science of physiognomy, as Bacon or as Lavater would have it, was held to be that of discerning the characters of the mind from the features of the face, or of discovering the ruling temper or passion, or other characteristic mental qualities, by regarding the form and actions of the body, and especially the cast, lineaments, and play of the face. Our inspection, in an extended sense of the word and in one especial to medicine, regards the physiognomy of disease. It regards the characteristic appearance of the patient in particular maladies, which appearance is made up of various combinations of many constituent factors, such as size, shape, colour, and movement of parts, attitude, aspect, gestures, and so on. In many heart maladies this physiognomy is characteristic. Cardiac distress has its own form of orthopnœa, recognizable at sight, and also its Cheyne-Stokes respiration. The latter, previously noted by Cheyne, was described vividly by Stokes, with the pencil of a master, in a couple of sentences. "It consists," wrote he, "in the occurrence of a series of inspirations, increasing to a maxi-

mum, and then declining in force and length, until a state of apparent apnœa is established. In this condition the patient may remain for such a length of time as to make his attendants believe that he is dead, when a low inspiration, followed by one more decided, marks the commencement of a new ascending and then descending series of inspirations.”* This striking and serious disturbance of the respiratory rhythm is found in the later stages of various forms of organic disease of the heart. It is not pathognomonic of any of these forms; certainly not of fatty degeneration, of which it was at one time held to be characteristic. It is found, too, in some cases of renal disease, sometimes of uræmic intoxication, sometimes in cerebral disease, and sometimes in tubercular meningitis. The central characteristic of Cheyne-Stokes breathing is a period of apnœa. Serious, as to the duration of life, as is the prognostic import of the appearance of this kind of disturbance of respiration, there is even an aspect of a compensatory and quasi-conservative kind in the long respiratory pause, in this waiting, as it were, of the breathing, until the feeble beats of a labouring heart can overtake it. The exact

* The Diseases of the Heart and the Aorta. By William Stokes, &c. Dublin. 1854. p. 324.

pathology of Cheyne-Stokes respiration has not been made out. Whatever may be the pathological explanation of this ominous perversion of breathing in cases other than those of failing hearts, when this respiratory trouble occurs in heart disease it may have an especial pathological basis. Perhaps it may not be too fanciful to think that, in this and in other morbidities of the heart, and in its health too, the cardiac ganglia, with their "grey matter," may be the local centres of a kind of sub-conscious intelligence, by which some nerve transmitted power is distributed, by the quasi-intelligent action of these little local brains, according to the circulatory needs of the moment. Perhaps we may think it likely, reasoning by physiological analogy, that, just as the depressor nerve bears from the heart an influence which passes through the medulla oblongata and causes reflex inhibition of vaso-constriction, so that blood pressure falls to suit the action of the left ventricle, so we may surmise that there may be a like communication between the heart and the respiratory centre, through which the breathing may be slowed down upon occasion, in correspondence with failing systoles; and so the apnœa becomes the physiological consequence of a syncopal stasis of the pulmonary circuit.

From a study of Cheyne-Stokes breathing I devised, some years ago, a clinical test which has been useful in practice. If we place a watch upon the front of the chest, over the middle of the sternum, of a healthy adult, who is lying upon his back, and tell him to hold his breath as long as he can easily do so, and if we time the breathing pause he makes by our watch upon his chest, we find that he will hold his breath for a quarter, or, perhaps, for a third of a minute. Sometimes in the case of a sufferer from a chronic disease of the heart in which there is a feebleness of ventricular contraction, and in which the patient is resting in bed, it will be found that the patient can hold his breath for a much longer time than a healthy person can, and that he will hold it for half a minute, a minute, or longer, and this even if his breathing be hurried by cardiac dyspnœa. This clinical fact seems explicable in the same way as was the respiratory pause in Cheyne-Stokes respiration. It appears that weak systoles of the right ventricle lengthen the time during which the breath can be held, because they permit such arrest when the blood tension in the pulmonary circuit is subnormal; such tension as compels inspiration is longer in being reached than when the heart is healthy.

In cases of degenerative mural disease this test is useful; its use from time to time gives a valuable prognostic. This is not discoverable in every case of cardiac dyspnœa; but it is found from case to case, especially in cases of fatty heart, and also, perhaps, in chronic valvular disease, when compensation is failing. It seems to be a change which is allied to Cheyne-Stokes respiration, to be a lesser degree of that abnormality, evoked by a voluntary stoppage of breathing. I think it will be found upon further examination of this test in practice that, in those cases in which the breath can be held longer than in health there is no blocking, or but little, of the pulmonary circuit.

We recognize a physiognomy of general cardiac suffering, apart from dyspnœa and apart from local pain, as the mark of a late stage of several forms of failure of the heart, when the malady nears a fatal ending. It is a peculiar unrest and distress, of regard, of face, of attitude, and of manner, with painful and frequent shiftings of posture. It is a physiognomy which mutely shews the obsession of a mighty dread, of a cardiac consciousness heaped up to the anguish of

“Impendent horrors threatening hideous fall,”

in which there is added to the wakefulness of restlessness an imminent fear of death and even a sense of dying, with a determination to keep awake because going to sleep appears so like going to die. There is the torture of trying to keep awake to keep alive. This is a characteristic pervigilium, always of mortal purport.

By palpation we appreciate palpitation, cardiac thrills, and pericardial rubs, and examine the position, character, and extent of the heart's impulse. The push, the screwing swing, and the drop, which make up the recurring stroke of the impulse beat, are factors of that beat which our *tactus eruditus* may be unable to separate, for they happen together, in the same part, at the same time. But they are movements which the skilled touch appreciates, without differentiating them, in their various morbid combinations, in the differences of this impulse in disease. They are movements which make up the well known characteristics of the healthy beat as felt by the hand, its mixed impulsive and gliding qualities, smooth, rather waving, decisive, unhasty, brief. It is impossible to describe the "feel" of the normal impulse beat; that is an experience which can only be learned in medical practice. We accept the systolic synchronism of the impulse; there

is no question about it now. Synchronously with the beginning of the first sound of the heart, and synchronously with the systoles of the ventricles, the shock of the heart strikes the side of the chest. In most healthy people the impulse can be felt by palpation in the same place where is seen the visible impulse. In stout, broad-chested people no impulse may be palpable; in such the absence of it is not of itself a morbid sign. Some passions of the mind, chiefly fear, exaggerate the force of the impulse beat and widen the space over which it can be felt, and even give it somewhat of a heaving quality; what is called nervousness does the same, to less degrees. In few words the more usual of the teachings of cardiac palpation may be summed up. In adynamic diseases the impulse is weakened, and it is also weakened or not palpable at all, when a pad of emphysematous lung covers it. The force and area of the impulse are increased when the heart is hypertrophied, and then the impulse point is variously displaced. Dilatation of one or of both ventricles, fatty change of the heart's walls or fatty loading of them, and pericardial effusions, may each lessen the force of the impulse beat, even to impalpability. Valvular thrill, the *frémissement cataire* of Corvisart and of

Laennec, at first thought to mark mitral disease, is now known to be an occasional sign in any of the four valvular diseases of the left side of the heart. It seems to need for its origin a rippling current of blood, in forcible motion. In such conditions, perhaps some degree of spanæmia favours its production; a slighter thrill, but one distinguishable easily from the true valvular thrill, is observable in some cases of spanæmia alone. True valvular thrill always shews forth structural valvular disease. There are no statistics published as to the proportions of the frequency of valvular thrill with any of the valvular defects which it may accompany; but it seems to occur oftenest with mitral stenosis, next with aortic obstruction, next with mitral insufficiency, and least often in aortic incompetence. Valvular thrill marks valvular disease of old standing. It is one of the signs by which we discover the effects of an endocarditis of some time ago. My experience agrees with that of Walshe, who never found acute endocarditis to be attended with valvular thrill, when there was certainty of the absence of old valvular disease. Later experience does not support his conclusion that "it has never been shewn that nervous excitement of the heart, pure and uncomplicated, will produce

thrill in people whose blood is healthy.”* It is true that valvular thrill never arises as a neurotism, and that it is always a mark of valvular deformity; but there is a thrill of a softer kind which is certainly only a neurotism. A gentle, systolic, thrill, somewhat tickling in quality, is palpable in some cases sometimes, when a palm is pressed over the impulse beat in nervous palpitation. Such palpitation has sometimes its own bellows sound, the bruit de consultation of some later French writers. One might call this thrill the *frémissement de consultation*. I think it comes and goes with the bruit, and the bruit comes and goes in half a dozen beats, perhaps in fewer: no bruit; no *frémissement*.

Touch adds to that of sight a physical sign of its own of frontal pericardial adhesions. In some cases of that morbid condition, the impulse beat is borne forwards and upwards during a deep inspiration, borne with and by the chest wall, in its advance and rise. This can be felt best by a palm applied flatly. Palpation is an old way of physical diagnosis as to the heart. It has continued in usefulness, and to-day it has not been displaced by any other method. It is never omissible in a complete examination.

* A Practical Treatise on Diseases of the Heart, &c. 1873.

In the eighteenth century it was one of the fruits of Harvey's epoch-making discovery of the circulation of the blood. It was practised by Albertini and by Senac before Avenbrugger invented immediate percussion. Then Corvisart adopted this percussion as an addition to palpation. Then, early in the next century, Laennec added his own mediate auscultation.* Palpation has an abiding place in practice, and we know its manifold applications in maladies of the heart. It is so reliable that it has become one of the methods which seniors amongst us perhaps develope unconsciously, in furtherance of their characteristic progress towards simplicity of methods, and their reduction of omissible instrumental accessories.

The College is fully aware of all the developments and refinements of cardiac auscultation which have been evolved, by the labours of many workers, since the time, now ninety years ago, when Laennec announced his discovery of mediate auscultation to the Académie des Sciences, in Paris, in the year 1818. As to diseases of the heart,

* See Historical Sketch to Diseases of the Endocardium. By Prof. Rosentein, of Leyden. Von Ziemssen's Cyclopedia of the Practice of Medicine. English translation. Vol. VI. 1876.

Laennec declared, and, as we know, rightly, that he had discovered a "set of new signs," which were, as he called them, "certain, simple, and prominent," and such as would render the diagnosis of those diseases, to quote his words, "as decided and circumstantial as the indications furnished to the surgeon by the introduction of the finger or sound in the complaints wherein these are used."* Since that time many physicians, amongst the chief of whom have been not a few of this ancient foundation, have worked in medical practice with the stethoscope, and have traced, distinguished, and named every acoustic quality and characteristic, of the various audibilities which the play of the heart can yield in health or in disorder, of every sound which the human ear can appreciate of those which make manifest the origin, onset, and course of every variety of cardiac malady. Every sound of all these which our hearing can distinguish has been recognized, and has been traced to its pathological origin, to its diagnostic significance, and to its remedial indications. No other area

* A Treatise on the Diseases of the Chest and on Mediate Auscultation. By R. T. H. Laennec, M.D., &c. Translated by John Forbes, M.D., &c. 3rd edition. London. 1829.

of work within the science and art of medicine can shew a progress more decisive, or knowledge more complete in its fulness, more illuminating in its clearness, in its import in our practice more significant or more helpful. This great mass of achievement, begun by Laennec, and developed by him wonderfully far from the immediate auscultation which was practised before his time, has grown and grows still, by slow experience and by the labours of many workers. Our hearing, and our sight, are our chief senses of inquisition. To our ear the examination of the heart has been opened fully.

We know the numerous modifications of Laennec's stethoscope which have been brought into use since his day, and which have been regarded often as steps in the evolution of his instrument towards perfection. In several particulars, real advances in the structure, shape, and form of the stethoscope have been made. Of course, the stethoscope does not magnify cardiac sounds; it only brings them within our ken. It elongates, so to speak, our ears, gives them a medium of distant contact, and circumscribes and concentrates our hearing. For several years last past I have worked with a solid wooden stethoscope, modified in several particulars after many experiments, and I find

such an one the best for auscultation, at the least, for cardiac auscultation. Acoustics, as well as practice, supports such a preference. I venture, in a very few words, to recall to my learned auditory the principles of the science of sounds which support my conclusion. The "points" of this stethoscope are:—it is made of wood, of cedar wood; it is in one piece; it is so long as about fifteen inches in length; it has an aural end of the usual shape and size; the chest end is accurately rounded to a hemisphere, with the base of the hemisphere three-quarters of an inch in diameter; the stem is tapered evenly from the chest end, to a diameter of three-eighths an inch, where it passes into the flat aural end; it is smooth but unpolished, so that it is relatively soft and warm to touch.* As to the comparative advantages, as a medium of transmission of sonorous vibrations to the ear, of a stethoscope in which the shaft is a hollow tube and of one in which the shaft is solid, it may be concluded with certainty that the teachings derivable from the principles of

* Messrs. Cuxson, Gerrard & Co., medical instrument makers, of Corporation Street, Birmingham, have followed with much care my directions as to the making of a stethoscope of this description, and have produced one which is satisfactory in its use, and which I find yields improved auscultatory results in auscultation of the heart.

acoustics would lead to preference of the solid instrument. Although it has become customary to use a hollow tube in all auscultation, this subject of the comparative values of solid and tubular instruments was one of friendly scientific controversy early in the history of stethoscopy. The merits of this dispute were summed up ably by Peyton Blakiston, a Fellow of this College, in 1848, who found theory and trial alike in favour of a quite solid stethoscope. He described a simple form of such instrument, of his own arrangement, and he was able to state, as he did in the remarkable chapter on the practice of auscultation in his book on diseases of the chest, that Dr. Watson, afterwards Sir Thomas Watson, whom some of us are so happy as to remember in the College, "one of the most accomplished and skilful physicians of the age," had "made use of this kind of instrument," namely, the solid stethoscope "in preference to any other, for some years past."* Again, to take in testimony the words of a master, C. J. B. Williams, a pupil of Laennec, and himself the greatest and earliest authority on auscultation in England, and an

* *Practical Observations on Certain Diseases of the Chest and on the Principles of Auscultation.* By Peyton Blakiston, M.D., F.R.S., F.R.C.P. London. 1848.

ornament of this College, writing in 1835, in the classic *Cyclopædia* of Forbes, Tweedie, and Conolly, pronounced that, "it might be well for the attainment of greater accuracy in physical diagnosis . . . if auscultators would use," instead of one stethoscope for every use of the instrument, "a solid cylinder of wood for the auscultation of the heart." The science of acoustics teaches that audible vibrations are conducted farthest and with least loss of intensity, firstly, through solids, next, through liquids, and least well through a gas, or through a mixture of gases. As a distinguished Fellow of this College and eminent physicist, Golding Bird, once put this point:—"The facility of the transmission of sounds is, like their velocity, greater in fluids than in gases, and still greater in elastic solids."* Of the certainties of acoustics which relate to stethoscopy, we know that, when an elastic body becomes the subject of vibratory motions of sufficient frequency a sound is produced, that if no material substance intervene between the vibrating body and the ear no sound is heard, that the transmissibility of sound is increased

* Natural Philosophy, &c. By Golding Bird, M.D., F.R.S., &c., and Charles Brooke, M.B., F.R.S. London. 4th edition. 1854.

if the vibrations be confined in a tube, and that sound travels through wood from eleven to seventeen times as fast as through air. When a sound is carried along a long tube the sound is doubled, one transmission of the sound being conducted by the walls of the tube, and a second transmission being made by the air inside the tube.* Instead of being discarded, it may be found that the solid wooden stethoscope of Laennec and of Williams may be improved and made the best of stethoscopes for cardiac use. It seems that the column of air in a tubular stethoscope is a practically negligible quantity, and that the walls of such an instrument are its chief conducting medium. Yet the simultaneous conduction of a sound through two media placed in parallel juxta-position, as through the air within the tube of a tubular stethoscope and through the elastically solid walls of that tube,—yet such dual conduction tends to doubling the sound, and would double it if the tube were long enough. The tube of a stethoscope is not long enough for such doubling. But may it not be long enough for two not quite synchronous transmissions to give to the ear a compound impression, to give to the ear two overlapping sensations, which yield a blurred

* Golding Bird and Brooke.

sound to our sense? Such blurring may be an important disadvantage in cardiac auscultation, especially in that finer distinction of cardiac murmurs which concerns the differentiation of organic and dynamic murmurs in some cases, and in that acuter appreciation of the heart's sounds which concerns the earlier diagnosis of valvular degenerations, and which only can be acquired by long practice, and comes in time to all who pursue cardiac auscultation faithfully. If we compare a solid with a tubular stethoscope in practice, we can hear sounds in auscultation well with the tubular one, there being enough of solidity in its walls for a fairly good conduction of the sounds; but the pitch of the sound is higher, and so more striking to the ear, when heard through the solid one. The solid stethoscope brings out well the soft, short, low-pitched puffs of the systolic bellows sounds which mark one of the kinds of neurotic disturbance of the heart. The chest end of such a stethoscope cleanses well. A long and rigid stethoscope, fifteen inches in length, has some administrative advantages in practice; one of that length is not too long for auscultatory percussion, and it is long enough to facilitate the use of that aid to diagnosis. As to the shape of the chest end, it is best rounded to the form

of half a sphere. A smooth hemisphere, and one not too small, made of a kind of wood which is not too hard, as cedar, gives the shape and the material which allow of comparatively greater pressure upon the part to which the smaller end of the instrument is applied in its use, without the least discomfort to the patient, and so, one would think, of the transmission to our ear of the sonorous vibrations we seek with the least loss of them in their convection. When a stethoscope is in use, comfort should be found at each end of it. There is another advantage in this half-ball-shaped end. I have wished long for a stethoscope which could be slided over the surface to which I was listening; could be slided without any breach of contact, like a ball castor, so that cardiac sounds could be the more easily traced as to the directions of their propagation. In some degree, a solid chest end of a stethoscope of hemispherical shape can give such sliding, and the noise of rubbing between the end of the instrument and the patient's skin can be ended by a little smearing with oil. A solid stethoscope then, of suitable size and shape, offers some preferabilities. To be too attentive to small things, to be meticulous, is, indeed, sometimes a fault, even in auscultation. But even genius

may be equalled by the art of taking pains, and in cardiac stethoscopy a small acoustic advantage may give a finer ear and a swifter skill.

LECTURE III.

(Delivered on Thursday, April 2nd, 1908.)

Mr. President, Fellows, and Gentlemen:—

Clinical observation and description have distinguished many diseases and disorders of the heart. Our increasing knowledge goes on to differentiate them still further; and this partly by a process of further subdivision, and partly by a more salient definition of distinctions before made out. We are accustomed, with a conventional brevity and with a fair working accuracy, to divide these maladies into two great classes, namely, diseases of the heart, and disorders of the heart. In this way of speaking all maladies of the heart are disorders of it, but all of them are not diseases. In this regard, the word disease appears to be reserved in practice, and so reserved not, perhaps, with the strictest etymological accuracy, but with a signification which is well understood, for naming those cases of cardiac malady which are characterized by particular changes in any part of the heart's structure, by changes therein of

what is known as a "coarse" kind. And the word disorder, as to a group of maladies of the heart which is a large one, is used in the designation of those cases of cardiac affection in which no such "coarse" change is discoverable. The same division of cases may be stated in other ways. Diseases of every organ of the human body are separable, for the purposes of verbal description, into two classes. In one class no local changes of structure and of tissue are apparent, and it may be said that the dynamics or that the metabolism of the organ alone are at fault. In the other class, structural and histological changes are found, and disorders of function appear to follow from such changes, as causal sequences. So, then, affections of the heart, may be said to be either dynamic or organic. This was Walshe's way of putting the matter. Or we may make the same division and speak of inorganic disorders and of organic diseases. The division of maladies of the heart into those of them which are dynamic and those which are organic is, at the best, a rough one. But these words, or their synonyms, express a division which is well understood in medical practice, and, if we are to divide these maladies at all, appears to be the best partition that can be made. We know the

limitations of meaning within which such a division can be used with accuracy.

In the beating heart we have to do with a living organ, upon the action of which life and many other functions depend, and the work of which organ depends upon the integrity of its structure and upon much else besides. The details of all this much else besides, are being distinguished and unravelled more and more. They are being brought under our remedial control more and more, *de die in diem*, and this in several particulars. At the least, our remedial control as to the heart is advancing, in the promotion of a normal metabolism, of a normal innervation, of a normal vascularity, of a normal sanguification. We recognize the effects of drugs, of dietetaries, of ingesta, of "surroundings," of respiratory and of muscular exercises, and of many other influences, upon the nutrition of the cardiac tissues, and upon the circulations in them, sanguineous and lymphatic. We recognize a great group of cardiac disorders in which functional disturbance is the only characteristic. We know, too, a great group of those cardiac diseases which depend upon certain well known material changes, upon organic changes, as they may be called properly, in the heart's form, in its

structure and tissues, as in the elements of its walls, in the size of its cavities, in the fabric of its valves, or in the size and boundaries of its orifices. These changes may arise in decay of tissue; in fatty degeneration, or in calcareous degeneration, or in a mixture of these. Or these changes may take their rise in inflammatory processes, and such may be acute, or subacute, or chronic in their course, and diathetic or microbic in their nature. There are many functional disorders of the heart in which no evidence whatever of organic disease can be found during life, which do not appear to shorten life, and in which no traces of organic change in the heart can be found after death. If in any such case organic disease should occur, such change scarcely could exist without revealing itself to complete clinical examination by its appropriate physical signs. Organic cardiac diseases depend upon "coarse" changes in the heart, which are declared in practice by physical proofs which admit very rarely of any interpretation but an unequivocal one. While such physical evidence may be discerned readily, in its rougher and elementary outlines, after a few months of clinical study upon adequate materials, the recognition of its finer shades can be acquired only after some years of work

upon it, and such longer experience may be advanced far by the fineness and distinctions of perception, by the quickness of pathological interpretation, by the alertness against error, which longer experience in practice alone can give.

In a large proportion of cases of cardiac affection the diagnostic distinctions between metabolic and dynamic disorders, on the one hand, and organic disease, on the other, can be found satisfactorily, and the case can be assigned accurately to one or to the other of these great groups. In some cases a hard and fast line of distinction cannot be drawn. Nor is this all. In some cases the heart is sound organically, but its functioning is disturbed because its innervation is organically changed. And further: an innervation which is changed organically may disturb a heart which is unsound itself. And again: while merely functional disturbance may affect a heart which is organically sound, it may also affect a heart which is unsound. Indeed, it is likely to be true that functional disturbance is more likely to affect an unsound heart than to affect a sound one. Walshe taught that, "the different perversions of the dynamics of the heart which are known clinically may exist in

association with structural disease, as well as independently of this.”* He found, as have we all, that the distinction in a case of dynamic disturbance of the heart as to the presence or absence of associated structural disease of that organ while often not a simple one, is occasionally a decision of intricate difficulty in practice. Our President has found that, “functional disturbance . . . is as frequently observed in association with diseased as in healthy hearts, and that many of the troubles and some of the catastrophes of cardiac disease are attributable to functional derangement.”† Professor Sir Clifford Allbutt, too, rightly has insisted upon the importance of our recognition of the frequency with which neurotic elements of disturbance are found in practice in association with organic disease of the heart. “We are too ready to assume,” he wrote, “that the diseased heart fails by means of its sheer

* A Practical Treatise on Diseases of the Heart, &c. By W. H. Walshe, M.D., F.R.C.P., &c. London. 1873.

† On the Principles which govern Treatment in Diseases and Disorders of the Heart. By Sir Richard Douglas Powell, Bart., M.D., F.R.C.P., &c. London. 1899. The Lumleian Lectures for 1898.

mechanical inability.”* It was with this conception in his mind that he was led, as he was in 1869, to recommend the subcutaneous injection of morphia in certain phases of heart disease. That functional disturbance may affect an unsound heart, and that an unsound heart is more prone to such disturbance than is a sound one, are considerations in practice of striking therapeutic indication and of much prognostic importance. We know that many a case of heart trouble, in which obviously the heart is diseased, is best relieved by leaving the heart alone, so to speak, and by directing our treatment to the removal of extrinsic causes of functional disturbance, and to their control and cure.

In the frequent admixture in practice of functional disorder and of organic disease of the heart, in some cases the one of these, in others the other, is to the fore. So, in the true view of them, we have four great clinical groups of cardiac maladies. We have simply organic diseases; we have simply functional disorders; we have organic diseases complicated by functional disorders; and we have functional disorders complicated by organic disease. To these

* Functional Disorders of the Heart. A chapter by the editor in *A System of Medicine* by many writers, edited by Thomas Clifford Allbutt, M.D., F.R.C.P., F.R.S., &c. Vol. V. London. 1898.

four groups, by the light of recent researches, we must add another, namely, one in which intrinsic functional disturbances of the heart's musculature are to be found. In practice, this is not always a distinct and separate group, because disorders of the cardiac musculature may complicate any of the four cases just distinguished. The healthy functioning of the heart depends upon several qualities in its muscular tissue. We have a myo-neurogenic explanation of the heart's working, in advance of the neuro-myogenic theory of the times just ago. In wasting diseases, in convalescence from acute diseases, especially from those of a pyrexial character, under the effects of various toxins, of auto-genetic origin or of microbic infection, the vital qualities of the heart's musculature become impaired. In such impairment of those vital qualities we find the explanation of many cases of cardiac enfeeblement, of temporary valvular incompetence, and of temporary dilatations of cardiac cavities. In this wider conception of cardiac maladies, the observations and experience of the clinician enable him to distinguish unerringly to which group any particular case may belong, and this in most cases at once, or soon, in the others after longer watching. This complexity of

cardiac maladies is what we find in practice. It would, indeed, be strange if disease of an organ so vital as the heart is in a patient's consciousness were not complicated by functional disturbance, of the kinds of such disturbance which are of emotional or of neurotic origin. Such disturbance is natural in the circumstances. And it is natural that the heart, linked as it is to many other organs by circulatory and by nervous connections, should be disturbed by extrinsic irregularities. Our therapeutics confirms this view. How often in practice do we omit the use of cardiac sedatives, of cardiac excitants, of cardiac tonics, of vaso-constrictors, of vaso-dilators, which so easily beset us, and all very useful when applied appropriately, to find such omission good, the heart's disturbance abated, and then to find the patient's comfort consummated under Gregory's powder, or under soda and calumba with an effervescent!

The nervous temperament, or nervous diathesis, as some prefer to call it, is the background, and, to change the metaphor, also the groundwork or basic principle, of most of the dynamic disorders of the heart. It is the basis of all the dynamic disorders of the organ, if there be excluded toxic causes, as the excessive use of tea or of tobacco, auto-toxic causes, as

goutiness, and as what may be called copræmia from excessive fæcal retention, and also if there be excluded spanæmia, and also, what is little accounted of in these days, plethora, and also if there be excluded those disturbances of the myocardium which are marked by impairment of tonicity and of contractility in any part of that highly specialized musculature, and also if there be excluded certain rare cases of bradycardia, and of tachycardia, with or without exophthalmia. With these exceptions, the nervous temperament is the basis of the inorganic maladies of the heart. The recognition of that temperament is the clue to their successful management. In these affections the signs of the patient's disposition interpret the symptoms of his indisposition. A temperament is an individual peculiarity, a type of idiosyncrasy, of the physical organization of a sentient and intelligent being, by which the manner of acting, feeling, thinking, and suffering is affected permanently. Our definition of a temperament may include other beings besides human ones. For an instance: the manifestations of temperaments can be well studied in horses, and they may be studied in them with advantage to our understanding of those manifestations in our own kind. A temperament is

a variant within certain limits of the natural organization of living individuals. That there are temperaments in human beings is an ancient doctrine in medicine. Yet, that there is a nervous temperament is a notion which does not seem to have been uttered until fifty years ago. It might be regarded as a product of our later civilization. But it seems to be a very old human characteristic, the differentiation of which has been recognized only in our own time. It was not until modern physiology had unravelled many of the mysteries of the nervous system, that the marks of this emphasis of that part of our being could be distinguished. The wide diffusion of incomplete information is a note of our time; except for it, there appears not to be more nervousness now than of old. Dr. Pritchard, in his great essay on temperaments, published in 1835, described four temperaments, namely, the sanguine, the phlegmatic, the choleric, and the melancholic.* Dr. Laycock, lecturing in 1862, described six temperaments: the nervous, the sanguine, the phlegmatic, the bilious, the lymphatic, and the melancholic. He found that, "persons nervously active from pre-

* The Cyclopædia of Practical Medicine. Edited by Drs. Forbes, Tweedie, and Conolly. Vol. IV. London. 1835.

dominant innervation are of the nervous temperament.”* Such persons might be said to have a nervous system which is “highly strung.” They have been said to be especially liable to nervous diseases. The truth would seem to be that they are no more liable to nervous diseases with “coarse” lesions than any bodies else; but that all other nervous diseases are peculiarly their own. The phrase a person of nervous temperament and the words a neurotic are not of identical connotation. A neurotic person is one of this temperament in an extreme degree of it, or one in whom a nervous temperament of lesser degree is not under control. A neurotic is a person with one or more nervous symptoms. Such symptoms may be subjective, or they may be objective, or they may be both. These symptoms of the neurotic may be called neurotisms. All the dynamic maladies of the heart, other than those excepted just now, are marked by neurotisms, and have their essence in them. There are, too, the mixed cases in which functional disturbances blend, variously, with the signs and effects of organic disease.

Some persons of this temperament may be known by their eyes, with sclerotics unduly

* The Medical Times and Gazette. 1862.

exposed, their eyes shewing a breadth of sclerotic between the cornea and the upper lids,—a sure sign, but one often absent. Temperaments appear oftenest in men. Few women shew them decidedly. But when a woman is of the nervous temperament in her it is well marked. Various temperaments may appear to be mixed in one person. A man of nervous temperament is quick in manner, if he have not a slowness which is obviously a calculated one; he may talk volubly and eat fast; he is apt to “overdo” everything into which his feelings enter, and they enter into most of his doings; he is apt for hobbies, and is often a collector of curiosities. If a good man, he is likely to make a worry of his goodness; if bad, he is apt for treasons and stratagems. Lingual physallization is a name I suggest for a constant mark of this neuropathic type. When a patient of this temperament shews his tongue in the usual way, two broken rows of small air-bubbles are seen in the moisture upon its dorsal surface. Each row skirts the lateral edge of the tongue, and lies about a seventh of the width of the organ from this edge, a row of bubbles on each side. I have found this appearance in hundreds of cases. Its pathognomy is unerring. How does it arise? The Newtonian

rule is safe, that we are to admit no more causes of a natural phenomenon than such as are true and enough. A little emotional increase in the viscosity of the mouth's moisture, as in fear, and a little emotional increase in the mouth's movements, as of swallowing, which is a physical accompaniment of what is called tenderness, and lingual physallization results. There are other signs of this temperament. Laycock knew that temperamental signs could be made out from handwriting. A little study of the subject, accordingly to the modern French school of graphology, yields points of medical suggestiveness.

We recognize with one consent that each case of functional disorder of the heart needs its own particular treatment, in medicines, in dietetics, in education, and in self discipline. If we can cure worry, that undue solicitude which Shakespeare called,

“A hell-hound that doth hunt us all to death,”—

if we can cure worry, we are far towards the cure of many cardiac neurotisms. Worry is curable in a large proportion of instances, and that permanently. Often worry is only a continued form of impatience. The line of impatience in each case must be found, and the patient taught to develope resistance thereunto.

He can develop such resistance in most instances. Worry usually is wearing and destructive. For the most part patients are to be helped against it. At the same time, experience in practice reveals that there are some worriers to whom worry appears to be a vital necessity, and in whom it is not to be resisted with advantage. How great, how curative, how durable in neurotic affections is the power of a patient to overcome harmful worry, under sympathetic and judicious medical guidance, is not recognized sufficiently. Each of us will prepare for such patients his own simple, comprehensive, and assimilable forms of an optimistic philosophy. Many such patients can be set aright, if we establish in them the pursuit of a sound ground work for daily happiness, for example, as in Chalmers's formula, by their pursuit of "something to do, something to love, and something to hope for." As in most nervous ills, the physician should be an adroit inspirer of hope, and of the patient's desire of cure, and belief he will get it.

It has long been known that strong and excited action of the heart, especially in a woman of nervous temperament, may cause murmurishness of the heart's first sound, as that sound is heard at the apex of the organ, and

even develope there a systolic murmur. In a case purely of this kind the signs of organic cardiac disease are wanting. The abnormal sound disappears as the excitement subsides, this change often occurring during auscultation, if the murmur be observed for a few moments. More recent work in practice has elucidated this dynamic endocardial murmur. Such a murmur has been called by Potain a "souffle de consultation." He noted it:—as arising with an acceleration of the beats of the heart, without any modification of the respiratory rhythm; as accompanying emotional disturbance, with the heart of normal size, and the pulse, although rapid, never irregular. Such is Piatot's account of the matter.* This is the murmur which might lead an incautious observer to a diagnosis of mitral insufficiency where no such inadequacy exists. I find this souffle de consultation is always systolic; it is to be found usually only in the mitral area, at and about the impulse point; it comes and goes under auscultation, that is, it alternates under observation, with a pure first sound; sometimes it is heard in the aortic area, too, and there,

* *Traitement des Maladies du Cœur par l'hygiène et les agents physiques.* Par M. le Docteur A. Piatot. Paris. Steinheil. 1898.

too, it is intermittent; very rarely, it is aortic in site alone. Further, it is to be heard that, this murmur, when it occurs in the anterior mitral area, goes with, accompanies, and is synchronous with, the first sound; it does not take the place of that sound there, as the true murmur of mitral regurgitation does. The *souffle de consultation* is recognizable as an addition to a weakened first sound. The murmur of mitral regurgitation replaces the valvular part of the first sound and masks the muscular portion of that sound. We know that the murmur of mitral regurgitation is audible usually in the left vertebral groove; in rare instances it is inaudible there. But the mitral *souffle de consultation* is limited, almost always, to the impulse point; it may also be audible at the inferior angle of the left scapula, but only with the extremist rarity. One may think that this bellow's puff of emotion, when it is mitral in place, arises from some perversion of the muscular part of the heart's first sound, or from insufficiency of that part of mitral closure which is ruled by the papillary muscles, or from both, under an emotional disturbance of cardiac innervation. When this puff is aortic in area, the fine edges of the aortic valves may give for the moment a sonorous vibration to the blood

passing the aortic orifice; one may opine that such an error of the lunulæ "getting in the way" would arise from arterial spasm.

Some cases of what may be called cardiac consciousness are explained in practice by the discovery of the post-systolic tug I have described, as a sign of pericardial adhesion. Such adhesion explains some cases of palpitation, and some cases of dyspnœa upon muscular exertion, in the absence of anæmia; also it explains some cases of cardiac failure under stress of sudden muscular effort, or of prolonged exhaustion of strength, or of both, or in some acute disease, especially in such acute diseases, as bronchitis or pneumonia, as bring danger to the blood flow in the pulmonary circuit. A condition so hampering to the heart's actions, as pericardial agglutination is, may make the difference between life and death at any time of cardiac stress.

Mitral insufficiency is the most frequent of all the chronic valvular affections of the heart. It is more frequent in practice than all the other valvular diseases of the heart put together. Mitral regurgitation, dependent upon organic mitral insufficiency, is marked by well known physical signs. With some exceptions, such insufficiency is the mark of a lesion which had

its local beginning in an acute rheumatismal endocarditis, usually, or in a mild form of other microbic endocarditis, rarely. Such endocarditis is exudative and proliferative in its processes, with the organization of new products. The valves become thickened, hardened, and bound by adhesions, and a chronic endocarditis, leading to sclerotic changes, sometimes follows the acute process. Sometimes, but in my experience very rarely, the endocarditis appears to be in a chronic form from its outset. Whenever the characteristic murmur of a mitral insufficiency marking endocarditis may appear, it has come to stay. Instances of its disappearance are almost unknown. I have never known one. It must be admitted, however, that complete recovery without any valvular damage is possible, especially in young subjects, and especially after prolonged rest and quiet in bed. Potain gives the good name *holosystolic*, wholly *systolic*, to the murmur of mitral regurgitation, so clearly and cleanly does it go with the ventricular contraction. The murmur is strong, often rough, often like the noise of a jet of steam, of equal course, with no maximum. Its tone may be high from the first, especially in young subjects, and its pitch lowers progressively,

accordingly as the insufficiency increases or the myocardium fails.* Sometimes, though rarely, mitral regurgitation, as it is declared by its murmur, exists for many years without any other consequent abnormality whatsoever. A lady is still under my observation who has enjoyed this very exceptional immunity for about forty years. If with the murmur there be any other of its associated abnormalities, say, in pulse, size of heart or of liver, other complications are sure to follow. Usually the period of complete compensation is brief. We notice how much longer this time is in the well to do, with sobriety and light work, than in our experience of hospital patients. This malady is a typical disease of the heart. Sooner or later the valvular lesion causes hyposystole, arterial hypotension in the greater circuit, arterial hypertension in the lesser circuit, with cardiac dilatations, venous stases, hepatic, renal and other congestions, œdemas and dropsies.

Accentuation of the part of the heart's second sound which arises at the mouth of the pulmonary artery and is best heard in the

* "Sa tonalité, élevée dès le début, surtout chez l'enfant, s'abaisse progressivement à mesure que l'insuffisance s'exagère ou que le myocarde faiblit." *Traitement des Maladies du Cœur*, etc. Par M. le Docteur A. Piatot. Paris. 1898.

“pulmonary” area, found and taught by Skoda in early stethoscopy, is an expressive sign of organic disturbance in the heart’s dynamics. Its interpretation is significant in practice, in diagnosis, in therapeusis, and in prognosis. This accentuation is an unfailing token of rise of tension in the pulmonary artery, of a threatening change in a vital circuit of the blood, which is beyond those tactile and metric tests which try variations of tension in systemic arteries. In health, the second sound is louder in the “aortic” area than in the “pulmonary.” A louder pulmonary second sound marks some obstruction in the pulmonary circuit. It is like the banging of a door which before was closed with little sound. This sign is united with lesions of the mitral valves and of the mitral opening. Either insufficiency of the mitral valves or narrowing of the mitral opening, or both, add a new hinderance to the blood stream in the lesser circulation. In so far as such a hinderance elicits increased systolic force in the right ventricle, by so much does it raise tension in the pulmonary artery, and so accentuate the pulmonary second sound. Old mitral regurgitation or old mitral stenosis, or both, may be without this accentuation, or even with a pulmonary second sound less loud

and clear than in health. This may arise from failure of the right ventricle, or from tricuspid regurgitation, or from both. In mitral disease, when the right ventricle at last fails to counter-vail the obstacle in the left side of the heart, the tension in the pulmonary artery falls, and with it the loudness of the pulmonary sound. When, too, in mitral disease, the tricuspid valves fail in their office, tension in the pulmonary artery falls. It would seem that this quasi-compensatory tricuspid regurgitation arises from widening of the ring of insertion of the valve, in the course of dilatation of the right ventricle, so that the valve cannot close the enlarged opening. In mitral disease, in the comparison of the pulmonary second sound with its aortic concurrent, we note that the aortic second sound is weakened relatively by the lowered systemic tension which results from mitral defects. Thus there is a pseudo-accentuation of the pulmonary sound. Such sound of normal loudness is not to be judged accentuated because it coexists with a weak aortic sound. Hence a difficulty in practice which only long experience can solve; but it solves it quickly and surely. My observations lead me to conclude that the presence or the absence of accentuation of the pulmonary

second sound, or a high degree or a low of such accentuation are valueless in a diagnosis between mitral stenosis and insufficiency. Each of these variants of mitral disease, whether singly or howsoever blended, adds an obstacle in the lesser circuit, and tends to increased tension in the pulmonary artery. So long as this obstacle is countervailed by the right ventricle, so long is the pulmonary second sound louder than in health. When this saving force fails, as by dilatation of the right ventricle or by degeneration of its walls, or by both of them, then the pulmonary sound fails too, and may be almost lost, or quite. When mitral disease first arises, the pulmonary second sound accents, but slightly only. During the usual period of quasi-health, from the time of convalescence from the usual initial acute endocarditis until the time of other complications, the sound remains but slightly reinforced; during this period, which may vary from a few weeks or months to a few or to many years, it is usually as loud as the aortic sound, or a little louder, but not so markedly. Towards the end of this time, when tension in the pulmonary artery is nearing the point of prevailing over the compensatory force of the right ventricle, accentuation becomes very distinct, and reaches

its loudest range. Then this sign is a grave one. It marks a height of tension not likely to be borne long. Then, as a straw upon the back of a labouring camel, some little effort or difficulty breaks down compensation. A little bronchial catarrh, and compensation fails, accentuation falls, viscera and surface congest, anasarca comes, and dropsies. Then by rest, by suitable evacuants, by indispensable digitalis, patients are likely to lose these later sequels of their mitral disease. As such an one improves, the pulmonary second sound swells again, as the right ventricle recovers its countervailing. With a rising sound comes recovery. But the complications of this later stage of mitral disease cannot always be removed even once; and if removed once, or oftener, at last treatment gains little or nothing. Then compensating powers are finally overcome; the pulmonary second sound strengthens no more.

In the removal of the congestive and dropsical complications of advanced mitral disease, my experience confirms the therapeutic efficacy of the well known combination of powdered leaves of digitalis, with squill and blue pill. I have found that, one pill, containing a grain each of the powder of digitalis leaf, of powdered squill, and of the officinal blue pill,

given thrice daily, suffices usually. In some cases, a larger proportion of digitalis in the pill is necessary for the good effects of the remedy; in such, the dosage of the drug should be increased, under skilful guidance and observation. This pill is often quoted as Baillie's pill, of the great Matthew Baillie, of this College. His pill, however, contained, in his own words, "five grains of the pilula hydrargyri, combined with one grain of the dried powder of squills and half a grain of the dried powder of digitalis," and he prescribed it in hydrothorax, when, as he wrote, "dropsy of the chest does not depend upon any diseased structure of the heart."* The powder of the leaf, in pill, and the infusion of the pharmacopœia, have proved, in my practice, to be the best forms of administration of digitalis. Therapeutics, so far as it concerns the treatment of patients by drugs, in organic diseases of the heart, and especially in that condition of those diseases in which what we know as compensation is at fault, turns very largely upon the questions, in what case to exhibit

* Lectures and Observations in Medicine. By the late Matthew Baillie, M.D. Printed in London in 1825. Baillie ordered in his last will that 150 copies be printed, "but not published."

digitalis, how to do so, and in what case to withhold it. Some sterling rules of practice in these particulars were reached by Withering, and laid down by him in his classical book upon the foxglove.* These rules have been refined since, notably in the distinctions between renal and cardiac diseases and dropsies, and generations of physicians of long practice have come to much clearness in the indications for the use of this great remedy. Digitalis is by far the best of the remedies of its kind. What it can do some other remedies can do in part; but none even that part so well. Digitalis has no succedaneum. As to when to give it or not, my own practice is, never to give it unless the indications for its use are complete, never to give it merely because the heart is affected; but to give it always, and then in efficient doses, when the veins and the arteries at the same time point to its use, namely, when the veins are too full and when the arteries are not full enough, and the pulse is soft.

Phlebotomy is necessary in danger of death from distension of the right cavities of the heart. In such a case I have seen the moribund saved by venesection. In such cases the old

* An Account of the Foxglove and some of its medical uses, &c. By William Withering, M.D., &c. 1785.

proud claim has been realized, "*multos mortis e faucibus eripimus.*" The more sudden the distension the greater the need for blood-letting. As the blood flows from the opened vein, the engorgement of the systemic veins, and consequently the paralysing distension of the right side of the heart, are diminished effectually; the right ventricle becomes able to propel its contents through the lungs, and so a fair supply of oxygenated blood is given to the brain and to the cardiac musculature. A cardiac cavity is a hollow muscle like the urinary bladder; hyperdistension of either results in its paralysis, with full retention of its contents. It is in cases of chronic bronchitis and pulmonary emphysema, complicated by dilatation of the dextral cardiac cavities, that mortal danger most frequently arises from engorgement of the right side of the heart. In hospital practice I saw a woman, a chronic bronchitic, aged fifty years. Upon becoming an in-patient her lips were bluish, with distended veins of neck, with orthopnœa, small and feeble pulse, lower extremities and hands œdematous, cardiac dullness increased transversely, with diffused impulse, hepatic dullness increased, sibilant and sonorous rhonchi all over chest, with large crepitations at bases of lung, and with scanty urine, one-fourthly albuminous. In four days

she appeared to be moribund, labouring, with tracheal râles, for her breath, with lips and tongue now purple, face deeply congested, veins of neck greatly distended, continued orthopnœa, and radial pulse irregular and almost imperceptible. The right median basilic vein was opened, and six ounces of very darkly coloured blood taken. The relief was at once; the pulse became regular and of fair volume, the dyspnœa lessened much, and also the venous distension, and the lips and face resumed an almost normal hue. In a fortnight she left the hospital—her œdema gone, and her urine free from albumen.

Within the thirty years last past, therapeutics in cardiac maladies has evolved two peculiar remedial procedures of importance, in certain varieties of physical training, and in certain respiratory exercises. Before that time rest usually was pressed in chronic heart cases, with no idea that any form of movement could be salutary. As to forms of physical exercises, Oertel, in 1875, following ideas which Stokes had expressed, advised muscular exercises; these he arranged in the form of walking up slopes, in progressively augmented ascensions, and to these he added a dietary restricted as to fluids. Other physicians have since advised other exercises. As to the restriction

of beverages, there is something to be said for it, both in the etiology and in the treatment of some chronic cardiac diseases. It appears that the use of physical exercises and of massage by cardiopaths dates back to a high antiquity; Piatot points out that Aretæus advised them in heart cases, and Galen for œdemas. In many cases of enfeeblement of the cardiac musculature I have found the exercise of running, especially in the open air, to be beneficial. The distance which can be run at first, even gently, without breathlessness may be only a few yards; in many cases the course can be lengthened a little daily, with advantage. A physiological appreciation of the various forces concerned in the circulation of the blood makes clear the physical foundations of the remedial employments of respiratory exercises. The use of these exercises is indicated strikingly in many cardiac maladies, in organic diseases of the heart, and in neurotic disorders of the organ. In the latter I have found them aidful in assuaging cardiac consciousness. Such exercises for cardiopaths appear to be of our own times. They are usually helpful in any form of hyposystole, and especially are they adjuvants to the blood flow in the pulmonary and hepatic circuits.

If we watch a cardiopath who is suffering

some of the less severe forms of cardiac pain, as the neuralgic, or as such as attends local hyperæsthesias, or painful dilatations of the heart's cavities, he will be seen usually to press the cardiac area with a flat hand, or to rub the part horizontally with palmar friction. Herein are instinctive movements which point to the remedial use of local plasters and liniments. The use of each, with their support and frictions, can be based upon anatomical and physiological grounds. I have found much benefit in practice from the twice daily use of frictions, prolonged for a few minutes, of rube-facient embrocations to the skin over the heart.

The remedial uses of alcoholic stimulants, under judicious guidance, in many heart cases are well known. The power of alcohol, when suitably exhibited, to evoke and to sustain the action of the heart's musculature is well established. I have found alcoholic remedies especially useful in practice in cardiac maladies when combined with spicy aromatics and anti-spasmodics, and I think we might revive the use of two good old cordials—of two old and good hearteners, usquebagh, which was officinal in the pharmacopœia of the College in 1677, and ipocrasse, which is a tincture of ginger and other spices in red Burgundy.

Now I must close my discourse, that I have related some points of diagnosis, of treatment, and of prognosis, in maladies of the heart, as I have found them in practice. Some subjects have been left untouched, because they have been less salient in my experience. Mr. President, I express to you, Sir, and to all this audience, my gratitude for the kind attention with which you have honoured me.

INDEX

	PAGE
Accentuation of the pulmonary second sound	85
Acoustics of stethoscopy	59
Adherent pericardium and cardiac consciousness	83
Albertini and palpation	56
Alcohol in cardiac maladies	95
Allbutt, Sir Clifford, on functional disturbance in heart disease ...	71
Aretæus, on physical exercises	94
Auscultation, mediate, influence of	16
,, ,, Stokes on	12
,, ,, value of	56
Avenbrugger's percussion	56
Baillie's pill	89
Bamberger, on the impulse beat	40
Band of His	28
Bird, Golding, on the transmission of sounds	61
Blakiston, on the solid stethoscope	60
Broadbent, Sir William H., on diseases of the heart	14
Brunton, Sir Lauder, on therapeutics of nitrites	11
Bulging over the heart... ..	42
,, ,, ,, in pericardial effusion	42
Cardiac consciousness and adherent pericardium	83
,, distress, physiognomy of	51
,, maladies, alcohol in	95
,, ,, auto-toxic causes of	74
,, ,, connections of	20
,, ,, divisions of	66
,, ,, embrocations in	95
,, ,, frequency of	18
,, ,, inspection in	36
,, ,, ipocrasse in... ..	95

	PAGE
Cardiac maladies, palpation in	52
„ „ physical exercises in	93
„ „ plasters in	95
„ „ plethora, a cause of	75
„ „ nervous connections of	23
„ „ running in	94
„ „ spanæmia, a cause of	75
„ „ toxic causes of	74
„ „ usquebagh in	95
„ „ Walshe on	15
Cardiograph, Marey's	11
Cerebral diseases, Cheyne-Stokes respiration in	48
Cheyne-Stokes respiration	47
„ „ „ in cerebral diseases	48
„ „ „ „ renal diseases	48
„ „ „ stasis of pulmonary circuit in	49
„ „ „ in tubercular meningitis	48
Circulation, systemic, summary of	34
Classification of maladies of the heart	66
Corvisart, Baron, on diseases of the heart	14
„ P. M. Latham on	15
Cyon, on ductless glands and cardiac functions	22
Depression, precordial, after pericardial effusion	43
Depressor nerve	28
Diagnosis, physical, progress of	17
„ therapeutics in	24
Digitalis, indications for use of	91
„ therapeutic action of	89
„ Withering on	91
„ Withering's revelation of	15
Dilatation, cardiac, palpation in	53
Dimpling inwards, in pericardial agglutination	43
Diseases of the heart, Broadbent, Sir W. H., on	14
„ „ „ classification of	66
„ „ „ Corvisart on	14
Disorders „ „	66
Douglas Powell, Sir Richard, on functional disturbance in heart disease	71

INDEX—CONTINUED

iii

	PAGE
Dynamic affections of the heart	67
„ „ perversions, Walshe on	70
Embrocations in cardiac maladies	95
Endocarditis and valvular diseases	84
„ „ rest in	84
Fluids, restriction of	93
Forty years, progress in	10
Frequency of cardiac maladies	18
„ „ „ Sir T. Watson on	19
Frémissement cataire	53
„ „ de consultation... ..	55
Functional disturbances with organic disease	70
„ „ „ „ Allbutt, Sir C., on	71
„ „ „ „ Douglas Powell, Sir R., on	71
Galen, on physical exercises	94
Glands, ductless, and cardiac functions, Cyon on	22
Groups, five, of maladies of the heart	72
Handwriting and temperaments	79
Harvey's example in physiology	32
Harvey, on the heart	21
Heart, healthy, palpation of	52
Heart affections, never such only	25
„ „ dynamic affections of	67
„ „ failing, arrested respiration in... ..	50
„ „ Harvey on the	21
„ „ inorganic affections of	67
„ „ maladies of, classification of	66
„ „ organic affections of	67
„ „ changes in, summary of	68
„ „ remedial control of	68
Heart's action, myo-neurogenic theory of	29
„ „ neurogenic theory of	29
„ „ security against stoppage of... ..	30
His, band of	28
Histology of the heart, recent advances in	27

	PAGE
Holosystolic murmur	84
Hypertrophy, cardiac, palpation in	53
Impulse beat	38
,, ,, absence of visible	41
,, ,, Bamberger on	40
,, ,, components of	40
,, ,, mechanism of	40
,, ,, visible, variations of	41
,, ,, Waller, Dr. A., on	39
,, ,, Walshe on	40
,, point	38
Inorganic affections of the heart	67
Inspection from above	45
,, ,, below	46
,, in maladies of the heart	36
,, value of	40
Insufficiency, mitral	83
,, ,, origins of	83
Intercostal spaces, widening of in pericardial effusion	42
Ipcrasse, in cardiac maladies... ..	95
Laennec's stethoscope	12
,, discovery of mediate auscultation	56
Latham, P. M., on Corvisart	15
,, ,, on therapeutics in diagnosis and prognosis	24
Laycock, on temperaments	76
Lingual physallization	78
Lymphatic circulation, importance of	21
,, ,, Waller, Dr. A., on	21
Maladies of the heart, five groups of	72
,, ,, ,, worry in	79
Marey's cardiograph	11
,, sphygmograph	11
Mediate auscultation, Laennec's discovery of	56
Mitral insufficiency, frequency of	83
,, ,, origins of	83
,, regurgitation	83

INDEX—CONTINUED

v

	PAGE
Mitral regurgitation, murmur of	84
„ „ prognosis in	85
Murmur of mitral regurgitation, changes in... ..	84
Musculature of heart, failure of	73
Myo-neurogenic theory of the heart's action... ..	29
Nervous connections of maladies of the heart	23
„ temperament and maladies of the heart	74
„ „ signs of	77
Neurogenic theory of the heart's action	29
Neurotic thrill	55
Neurotisms	77
Nitrites, Sir Lauder Brunton, on therapeutics of	11
Oertel, on physical exercises	93
Organic affections of the heart	67
„ changes in the heart, summary of	68
„ disease with functional disorder	70
Palpation, in adherent pericardium	55
„ „ dilatation of the heart	52
„ „ hypertrophy of the heart	53
„ „ maladies of the heart	53
„ of normal heart	52
Pericardium, adherent, cardiac consciousness in	83
„ „ dangers of	83
„ „ palpation in	55
„ agglutination, dimpling inwards in	43
„ „ post-systolic tug in	44
Pericardial effusion, bulging over heart in	42
„ „ depression, precordial, after	43
„ „ elevation of left sternal edge in	42
„ „ Roberts, Dr. Frederick, on	43
„ „ Sturges, Dr., on	42
Peripheral resistance	33
Physical diagnosis, certainty of	69
„ „ experience in	68
„ „ progress of	17

	PAGE
Physical exercises, Aretæus on	94
,, ,, Galen on	94
,, ,, Oertel on	93
,, ,, Stokes on	93
Physallization, lingual... ..	78
Physical signs, value of	12
Physiognomy	47
,, of cardiac distress	51
Physiological basis of practice... ..	33
Physiology of the heart, recent advances in... ..	27
,, integral in medicine	32
Piatot, on souffles de consultation	81
Plasters, in maladies of the heart	95
Plethora, a cause of maladies of the heart	75
Potain's holosystolic murmur	84
Potain, on souffles de consultation	81
Powell, Sir Richard Douglas, on treatment in maladies of the heart	14
Pritchard, on temperaments	76
Prognosis, improved	14
,, in mitral regurgitation	85
,, therapeutics in	24
Progress, in last forty years	10
,, ,, the nineteenth century	14
Pulmonary circuit, stasis of	49
Pulmonary second sound, accentuation of	85
,, ,, ,, indications of	86
,, ,, ,, Skoda on	86
Regurgitation, mitral	83
Renal disease, Cheyne-Stokes respiration in... ..	48
Respiration, arrested in failing heart... ..	50
,, Cheyne-Stokes	47
Rest, in endocarditis	84
Right cavities of heart, distension of... ..	91
Roberts, Dr. Frederick, on pericarditis	43
Running, in cardiac maladies	94
Second sound, pulmonary, accentuation of	85
Security against stoppage of heart's action	30

	PAGE
Self-training in worry	80
Senac and palpation	56
Signs of nervous temperament	77
Skoda on the pulmonary second sound	86
Solid stethoscope, Blakiston on	60
„ „ Watson, Sir T., on	60
„ „ Williams, C. J. B., on	60
„ „ wooden stethoscope	58
Souffles de consultation, physical causes of	82
„ „ Piatot on	81
„ „ Potain on	81
Sound, transmission of, Bird, Golding, on	61
Spanæmia, a cause of maladies of the heart ..	75
„ „ thrill in	54
Sphygmograph, Marey's	11
Sternum, elevation of left side of	42
Stethoscope, action of	58
„ „ improved solid, advantages of... ..	63
„ „ influence of discovery of	16
„ „ solid wooden	58
„ „ „ improved	59
„ „ tubular, disadvantages of	62
Stethoscopy, acoustics of	59
Stokes, on Cheyne-Stokes respiration	47
„ „ „ physical exercises	93
„ „ „ stethoscopic auscultation	12
Sturges, on pericardial effusion	42
Temperament, definition of	75
„ „ „ nervous, and maladies of the heart	74
„ „ „ signs of	77
Temperaments and handwriting	79
„ „ „ Laycock on	76
„ „ „ Pritchard on	76
Therapeutics in diagnosis and in prognosis	24
Thrill, as a neurotism	55
„ „ of spanæmia	54
„ „ valvular	53
Toxic causes of maladies of the heart	74

	PAGE
Tubercular meningitis, Cheyne-Stokes respiration in ...	48
Tug, post-systolic	44
Usquebagh, in maladies of the heart	95
Valvular disease and endocarditis	84
,, thrill	53
Venesection in heart disease	91
Waller, Dr. A., on the impulse beat	39
,, ,, on the lymphatic circulation	21
Walshe, on dynamic perversions of the heart's action ...	70
,, ,, the impulse beat	41
,, ,, maladies of the heart	15
,, ,, pericardial agglutination... ..	43
Watson, Sir T., on the frequency of maladies of the heart ...	19
,, ,, ,, solid stethoscope	60
Williams, C. J. B., on the solid stethoscope	60
Withering, on digitalis	91
,, ,, his revelation of digitalis	15
Worry and maladies of the heart	79
,, ,, self-training in	80
,, ,, treatment of	80

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